

**U.S. PATENT APPLICATION**

**INVENTION : Virtual Electronic Back-up Alignment Apparatus**

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**VII. CLAIMS**

What is claimed is:

- 1 1. An apparatus for aligning a vehicle hitch mounted on a vehicle to a tow hitch of a  
2 trailer, comprising:  
3 means for emitting a light beam;  
4 means for securing the means for emitting the light beam to the vehicle;  
5 means for energizing the means for emitting the light beam;  
6 a reflective member; and  
7 means for receiving the light beam from the means for emitting the light beam and  
8 reflecting the light beam from the reflective member toward the trailer for forming a tow hitch  
9 alignment point on the trailer for aligning the vehicle hitch to the tow hitch.
- 1 2. The apparatus of Claim 1 wherein the means for emitting the light beam is a laser  
2 pointer, the laser pointer having an elongated body having a light source actuator and an  
3 opening in the elongated body to allow the light beam to exit the elongated body.
- 1 3. The apparatus of Claim 2 wherein the light source actuator is located along the  
2 exterior of the elongated body and, upon depression of the light source actuator into the  
3 elongated body, the light source actuator activates the means for emitting the light beam for  
4 releasing the light beam through the opening and into the means for receiving the light beam.

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1 4. The apparatus of Claim 1 wherein the means for securing the means for emitting the  
2 light beam to the vehicle is a housing, the housing having a column for receiving the means  
3 for emitting the light beam.

1 5. The apparatus of Claim 4 and further comprising magnets mounted on the housing for  
2 securing the housing to the vehicle.

1 6. The apparatus of Claim 4 wherein the means for energizing the means for emitting the  
2 light beam is a slip ring, the slip ring forming a portion of the column that covers the exterior  
3 of the means for emitting the light beam, the slip ring traversing the exterior of the means for  
4 emitting the light beam and depressing the light source actuator into the elongated body of  
5 the means for emitting the light beam.

1 7. The apparatus of Claim 1 wherein the means for receiving the light beam from the  
2 means for emitting the light beam comprises a gravity orientation balancer and a pair of  
3 wheels, the orientation balancer and the pair of wheel enabling the light beam reflecting from  
4 the reflective member to be maintained in a horizontal plane.

1 8. The apparatus of Claim 7 wherein the gravity orientation balancer has a top surface  
2 further defining a channel therein, a bottom surface, and a pair of arms.

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1 9. The apparatus of Claim 7 wherein the reflective member is frictionally received into  
2 the channel of the gravity orientation balancer.

1 10. The apparatus of Claim 9 wherein the reflective member forms an angle to the light  
2 beam released from the means for emitting the light beam.

1 11. The apparatus of Claim 10 wherein the angle is substantially forty-five degrees.

1 12. The apparatus of Claim 7 wherein the wheels have a center tube and an outer tube,  
2 the center tube separated from the outer tube by a plurality of ball bearings with dividers  
3 placed between each of the plurality of ball bearings, the center tube further defining a hollow  
4 opening.

1 13. The apparatus of Claim 12 wherein each arm of the gravity orientation balancer is  
2 fixedly secured within the hollow opening of the center tube of a corresponding wheel.

1 14. The apparatus of Claim 7 wherein the gravity orientation balancer, the reflective  
2 member, and the pair of wheels are housed within a hollow, transparent tube closed on one  
3 end by an end cap and secured to the housing by a connection member on the other end.

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1 15. The apparatus of Claim 1 and further comprising an anti-collision device for  
2 measuring the distance between the vehicle and the trailer.

1 16. The apparatus of Claim 1 and further comprising an ultrasonic device for measuring  
2 the distance between the vehicle and the trailer.

1 17. The apparatus of Claim 16 wherein the ultrasonic device has a plurality of light  
2 emitting diode indicators, the plurality of light emitting diode indicators each representing a  
3 different distance to the trailer and providing the user an indication of how close the vehicle  
4 is to the trailer.

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1 18. An apparatus for aligning a vehicle hitch mounted on a vehicle to a tow hitch of a  
2 trailer, comprising:

3 means for emitting light, the means for emitting light generating a light beam for  
4 producing a virtual tow point on the trailer;

5 means for automatically maintaining the means for emitting light and the light beam  
6 in a horizontal plane; and

7 a housing for securing the means for emitting light and the means for automatically  
8 maintaining the means for emitting light to the vehicle.

1 19. The apparatus of Claim 18 and further defining a means for energizing the means for  
2 emitting light.

1 20. The apparatus of Claim 19 wherein means for energizing the means for emitting light  
2 is a switch.

1 21. The apparatus of Claim 18 wherein the means for automatically maintaining the means  
2 for emitting light and the light beam in a horizontal plane comprises a free rotating mirror  
3 assembly for receiving the light beam generated from the means for emitting light and  
4 redirecting the light beam from the vehicle towards the trailer, the free rotating mirror  
5 assembly having an orientation balancer, a mirror, and a pair of wheels.

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1 22. The apparatus of Claim 21 wherein the orientation balancer has a top surface further  
2 defining a channel therein, a bottom surface, and a pair of arms.

1 23. The apparatus of Claim 21 wherein the mirror is frictionally received into the channel  
2 of the orientation balancer.

1 24. The apparatus of Claim 23 wherein the mirror forms an angle to the light released  
2 from the means for emitting light.

1 25. The apparatus of Claim 24 wherein the angle is substantially forty-five degrees.

1 26. The apparatus of Claim 21 wherein the wheels have a center tube and an outer tube,  
2 the center tube separated from the outer tube by a plurality of ball bearings with dividers  
3 placed between each of the plurality of ball bearings, the center tube further defining a hollow  
4 opening.

1 27. The apparatus of Claim 26 wherein each arm of the orientation balancer is fixedly  
2 secured within the hollow opening of the center tube of a corresponding wheel.